

# A Comparison of Suburban and Inner-City Condominium Markets\*

A. Skaburskis  
School of Urban and Regional Planning  
Queen's University, Kingston, Ontario K7L 3N6

## Introduction

This article describes the spatial changes brought about by the growth of the condominium sector since its introduction to Canada in the late 1960s. It examines the likely effects that the increasing demand for condominiums will have on urban density profiles and on the characteristics of inner-city neighbourhoods. Further, it reviews the spatial implications of the growth of this housing sector and presents a set of profiles of its sub-markets. The analysis uses data from a 1983 survey of condominium occupants sponsored by the Canada Mortgage and Housing Corporation (CMHC).

The owner-occupants who considered only an inner-city location are compared with those who confined their search to the suburban part of their city when they were looking for their present condominium. This study extends earlier work by the author (Skaburskis 1988) by using the conclusions of the former to develop a method of analysis that employs spatially disaggregated and definable sub-samples that allow a clear articulation of the differences between the two main condominium sub-markets. The prior spatial disaggregation of the market allows the use of discriminant analysis to identify the factors that distinguish sub-markets and to assess their relative importance.<sup>1</sup>

\*An early version of this paper was presented at the 1988 Urban and Housing Studies Conference in Winnipeg. I would like to thank CMHC for permission to use their data for the analysis presented in this article, and I am grateful for the assistance offered by Mr. Christopher Terry, senior analyst for CMHC. I would also like to acknowledge the valuable contribution of my co-investigator, Professor Stanley Hamilton of the University of British Columbia. I am indebted to an anonymous referee for helpful comments.

<sup>1</sup>The development of the coefficients for the discriminant function requires that the cases be classified as belonging to one group or another. This requirement

Work with the selected and more polarized sub-sample yields a larger number of interpretable principal components that reveal the existence of several inner-city condominium sub-markets.

### The Relevant Market Attributes

The CMHC survey was commissioned to develop information on the characteristics of condominium markets and the factors that affect their growth. The attributes considered relevant to descriptions of housing markets were covered in the questionnaire by sets of questions on:

- the characteristics of condominium units and buildings;
- respondents' household characteristics, housing expenditures and the nature of their previous housing;
- length of stay in their previous dwellings and their current condominiums;
- commuting times before and after moving to their current dwellings;
- reasons they decided to move from their previous dwellings;
- information on the housing options they considered before buying their present units;
- their perceptions of the extent of available housing options (to determine the prevailing market conditions at the time they bought their condominiums);
- reasons for buying a condominium, and why they chose their particular buildings and units;
- satisfaction level; and
- future housing plans.

The data were examined using cross tabulations to develop a profile of the condominium owners and their housing choices. Variables were selected to develop information on the ten general attributes described above. The criteria for selecting the specific variables were based on the relevance of the information they contained and on the likelihood that the variable would help differentiate sub-markets and adequately describe the relevant attributes of a housing market. The variable definitions and their construction methods are presented in the Appendix.

The inner-city and suburban sub-markets are compared in three stages. The first describes the sub-samples, presents the data and

precludes using data on people who considered both options. The estimated discriminant function presented in this article could, as an anonymous referee has suggested, be used to classify the people who considered both locations and then compare their actual choices with the function's predictions.

compares the means of the fifty variables describing the ten main attributes of housing markets. The comparison is then expanded through the use of discriminant analysis, which shows the contribution each variable makes to our ability to distinguish between the two sub-markets. The last stage of analysis develop principal components that help identify a number of characteristics of condominium markets. The principal components' correlations with the variable identifying the two spatially distinguishable sub-markets will introduce the spatial dimension to this analysis.

### The Data

The data used in this article were developed by a 1983 CMHC survey of condominium occupants. The survey was carried out in nine Canadian cities: Vancouver, Kelowna, Calgary, Saskatoon, Mississauga, Toronto, Trois-Rivières, Quebec City and Halifax. The cities were carefully selected by the author, in consultation with federal and regional CMHC analysts, to represent the different types of condominium markets that had evolved in Canada. In addition, the set of cities and the distribution of the survey effort among the cities was determined by our aim to form a judgment sample that would represent the Canadian condominium market. The city of Vancouver was included in the survey because it has one of the largest and oldest condominium sectors. As the Kelowna condominiums were bought primarily by retired people, this city was chosen to represent a retirement community. Calgary was experiencing a major downturn at the time of the survey and had a declining housing market. Saskatoon was a relatively small city in which analysts were surprised to find a growing condominium market. Toronto and Mississauga formed counterpoints to each other, making it possible to compare a large inner-city condominium market with a rapidly growing suburban one. Trois-Rivières had just received its first condominium projects, and the survey tried to determine why people would buy a condominium in a city with low land prices and a good stock of affordable single-family dwellings. Quebec and Halifax metropolitan areas had small but stable condominium sectors that appeared to be on the verge of new, rapid growth.

The sample universe consists of all the condominium units that were registered in 1983 within the selected cities or metropolitan areas. Duplexes were excluded. The sample frame was developed from lists of condominium projects arranged by date of registration. Equal probability samples of condominium units were obtained from each city through a two-stage process; the first stage selected the building, and the second stage developed the systematic random samples of units

within each of the selected buildings. Systematic samples of projects were drawn from the ordered registration lists to ensure the fair representation of early and more recent projects. The sample was stratified into groups of large and small projects: those with more than forty units, and those with fewer.<sup>2</sup> This ensured that both the large and small projects were represented. Because we expected relatively greater intra-project variation within the smaller projects and greater inter-project variation in the population characteristics of the large projects, the first stage of sample favoured the large projects over the small ones by a ratio of 2 to 1. Equal probability samples of dwelling units were obtained by selecting proportionally twice as many units from the selected small projects as from the large condominiums.

A total of 196 projects were selected from the nine cities, and 3,165 questionnaires were delivered by qualified interviewers who explained the purpose of the survey and arranged to pick up the completed questionnaires the next day. Of the 1,735 questionnaires completed (55 percent response rate), 1,410 were from owner occupants and the rest from renters. The survey of 196 condominium council chairpersons that was carried out parallel to this work asked for their estimates of the rental population; over half (55.0 percent) of the projects had at least 20 percent of their units rented and the average building with owner occupants present had 20 percent of their units rented. These estimates seriously understate the rental population within the condominium sector. The survey of occupants primarily sought information on condominium owners and, therefore, understates the true proportion of renters living in condominiums. In both Toronto and Mississauga a number of buildings had to be replaced because they did not house condominium owner-occupants. At least half a dozen Mississauga registered condominiums had to be replaced during the first sampling stage (7 net replacements in Mississauga, 6 in Toronto) because the interviewers could not identify a condominium council chairperson and the superintendent did not know their building was a condominium.

The finding of a large proportion of rental only buildings within the registered condominium stock documents the emergence of the "syndicated" condominium that is really offering rental accommodation. The author's finding 1 in 3 Toronto condominium projects as being exclusively rental helps explain John Miron's observation of the large difference in the number of registered condominiums and the numbers developed through housing and household surveys such as HIFE (verbal communication). Christine Lucyk of Coopers & Lybrand

<sup>2</sup>The project size cutoff was based on the observation that condominium projects with more than forty units generally require professional management, while smaller projects can be managed by their condominium councils.

is currently estimating the size of the syndicated condominium sector and is finding that approximately one in three buildings is a syndicated condominium (verbal communication). These observations explain why new rental accommodation is being continually advertised while housing statistics show that virtually no rental buildings are being built in Toronto. Finding that a large proportion of condominium projects serve the rental market should not be surprising. The registration of new rental buildings as condominiums eliminates condo-conversion problems later on should the owners decide to sell out their project. The condominium registration is often a more convenient arrangement when a number of investors are involved; it allows greater flexibility and liquidity than limited partnership options.

The sample size was determined by the study budget. An attempt was made to select city sub-samples that related to the size of the city. The decision to sample the entire CMA in the case of Quebec and Halifax, and the city in the case of Toronto and Vancouver, was based on the size of the universe in each area, the interviewers' travel costs, and the desire to have a reasonable size of sub-samples for the two major inner-city markets.

Although sampling ratios differ across the nine cities, the difference is not accounted for by weighting the cases. The focus of this article is on the differences among condominium owner-occupants who seek suburban as opposed to inner-city locations, not on the number of owners in any one category.<sup>3</sup>

### The Hypothesis

Neoclassical location theory has explained that wealthier people tend to move to the outskirts of the city because they buy more housing and are therefore willing to accept higher commute costs for a greater reduction in the total price of land. A given reduction in the price of one "unit" of housing service or in the per-square-foot price of land offers them proportionally greater savings than would its equivalent offer those with lower incomes. We should, therefore, expect to find the higher-income households and larger condominium units in the suburbs. Lower-income people will accept the higher densities of the inner city to reduce their per-dwelling unit land price. This hypothesis

<sup>3</sup>The actual proportion of respondents in any one category is not of interest here. The analysis develops generalizable conclusions regarding the differences between two spatially distinct sub-markets, and knowledge of these differences can be obtained with samples that are not strictly representative of the Canadian market. The differences can be assessed without bias using sub-samples drawn with sampling ratios.

has already been examined (Skaburskis 1988). Lower-income households tend to move to somewhat smaller suburban condominiums. The neoclassical models may still apply, but in the case of condominiums the usual preference assumptions do not hold.

The starting point here may go back to the work of David Ricardo (1817) to consider differences in fertility (amenity) as possible determinants of the urban spatial structure. Condominiums allow households that insist on home ownership access to the amenities of the inner city. Access is affordable because of the higher-density home-ownership option made possible by condominium tenure. In conjunction with the locational amenities, condominium project facilities increase the value households can derive from their immediate inner-city environment. The differences in the spatially definable condominium sub-markets may be explained by differences in locational amenities and differences in households' valuation of these attributes. It is the search for the characteristics of the households who value most the inner-city combination of amenities that is the subject of this paper. The descriptions may form the basis for future hypotheses.

### Description of the Sub-Samples

Tables 1 and 2 present the locations the owners considered when they bought their present condominiums. The tables provide breakdowns by city, building type, construction cost, and a number of household characteristics. The tables list the percentage of households responding "yes" to each category. The distribution of households considering suburban and inner-city locations varies across the cities in ways one would expect. High-rise occupants tended to look in the inner core, while proportionally more row-house buyers considered the suburbs. The people buying the more luxurious and costly (per square foot) units most often considered inner-city locations.

The Table 2 statistics show a remarkably constant proportion of households considering housing options within their previous neighbourhood. The suburban/inner-core considerations vary across life-cycle stages and income categories. Households with children look to the suburbs. Proportionally more wealthy households consider inner-core locations. A larger proportion of households with more than one wage earner consider suburban locations even though this means they will jointly be spending more on commuting.

The analysis in this article will focus on the households who considered only an inner-core location or a suburban location but not both. The sub-samples that were drawn for the analysis consist of two exclusively defined groups of households. Table 3 lists the variable

Table 1  
LOCATIONS CONSIDERED, BY CITY, BUILDING STRUCTURE AND  
PRICE PER SQUARE FOOT

City	Previous Neighbourhood	Suburbs	Inner City	Outside Metro	n Cases
Halifax	41.3%	49.0%	33.3%	13.7%	211
Quebec	57.5	28.4	58.0	3.0	223
Trois-Rivières	23.5	25.8	51.5	3.2	39
Toronto	45.2	12.8	72.9	6.1	146
Mississauga	51.0	60.1	9.8	32.0	153
Saskatoon	41.3	62.5	32.5	7.5	123
Calgary	50.4	60.5	16.8	8.4	123
Kelowna	37.6	34.8	53.8	14.0	105
Vancouver	53.7	33.2	38.0	9.0	157
<b>Building Type</b>					
Row/Townhouse	45.1	54.9	28.9	14.4	749
Low-Rise	50.0	30.7	43.7	11.2	227
High-Rise	51.8	20.5	58.4	5.4	396
<b>Price per square foot (\$1983)</b>					
Under \$50	49.2	57.6	29.9	14.1	184
\$50 to \$75	46.5	45.9	41.9	11.4	404
\$75 to \$100	42.9	30.3	44.9	9.3	176
\$100 +	54.7	23.4	55.9	6.3	163
All Cases	47.8%	41.2%	39.9%	11.3%	
n Cases*	1319	1300	1312	1300	

\*Lower than 1372 due to question non-response.

means for the inner-city and suburban sub-samples. Missing values for the categorical variables were assigned a zero value for use in the discriminant analysis.<sup>4</sup> This procedure biases the estimated proportions downward for both groups of households and therefore does not alter the conclusions. The table presents the t-statistic and the significance level associated with the tests for differences in means of the variables that will be used in the multivariate analysis. While the differences are statistically significant for most variables, a brief review of the table does evoke some interesting observations regarding the characteristics of each sub-market as defined by the locations the households considered. Both sub-markets have row, townhouses and

<sup>4</sup>The elimination of cases with missing data would seriously reduce the sample size due to the large number of variables used in the analysis. Analysis with the smaller data set could lead to greater errors than those introduced by the small and recognized bias.

high-rise buildings, but the proportions differ as expected. Condominiums present a higher-density housing option for the suburbs. In the inner city, only half the condominium owners live in high-rise buildings; a third are in row townhouses, and the remainder live in "low-rise" buildings with fewer than four floors. The floor area of the inner-city and suburban condominium units is about the same in the two sub-markets, but the number of rooms is not; the suburban units have, on average, more rooms, are less spacious, and are likely to be less "luxurious."

Table 2  
LOCATIONS CONSIDERED, BY HOUSEHOLD TYPE, INCOME AND  
EMPLOYMENT CATEGORIES

	Previous Neighbourhood	Suburbs	Inner City	Outside Metro	n Cases
<b>Household Type</b>					
Single 40-	51.8%	39.8%	55.4%	10.8%	88
Couple 40-	54.9	52.8	48.0	16.8	123
Preschool	47.9	62.5	27.6	23.1	154
School	47.7	54.0	22.9	11.0	204
40-64	47.6	34.6	45.0	8.0	518
65+	44.0	26.7	41.6	9.1	260
<b>Income</b>					
Under \$20,000	47.3	44.8	29.7	12.7	191
\$20,000-\$35,000	43.8	46.9	37.5	11.8	290
\$35,000-\$50,000	52.3	50.0	38.5	12.8	223
\$50,000+	43.2	31.7	54.4	8.4	173
<b>Employment</b>					
One Employed	53.6	33.6	49.7	6.2	322
Full+Homemaker	44.4	45.9	32.5	14.3	220
2 Employed	49.4	51.0	38.5	13.3	431
2+ Employed	50.0	42.6	25.5	13.0	57
Retired	40.0	33.1	38.2	12.2	285
All Cases	47.8%	41.2%	39.9%	11.3%	
n Cases	1319	1300	1312	1300	

The average household income is higher in the inner city, a finding that counters the usual description developed by most neoclassical models (Alonso 1964; Muth 1969). The neoclassical models explain why the households with more money generally buy larger housing units and move to more distant locations that offer lower per-square-foot land prices. The survey of condominium occupants shows the wealthier people moving closer to the inner city to gain proximity to its desired attributes. While the average purchase price was higher in

the inner city, the two groups of owner-occupants had similar housing expenditures. This shows that the inner-city condominiums were bought with proportionally higher down payments.

The previous housing of the two groups of owner-occupants differs in that most of the inner-city buyers had lived in large units before they bought their condominiums, while the suburban buyers increased the size of their dwelling when they moved to condominiums. The two groups could not be distinguished by their stated satisfaction with their condominium purchase or by the proportion of households previously in single-family detached dwellings. The mobility of the owner-occupants in both groups, as indicated by their average length of stay in their present condominium and in their previous dwelling, is about the same. While the suburban households have, on average, more people that commute to work (1.31 compared to 1.10), they also have to spend more time commuting to work. Nevertheless, the suburban buyers reduced their average commuting time the most by moving to a condominium. A larger proportion of inner-city owners had previously lived in the same neighbourhood as their condominiums. Many condominium buyers within both sub-markets moved closer to the city centre. The statistics show that the suburban buyers moved, on average, the greatest distance, but this finding must be qualified by the observation that a larger number of people were moving to the suburbs from outside the census metropolitan area.

The reasons the two groups of owners moved from their previous housing differ in all but one respect. A similar proportion of buyers in the two sub-markets moved as a result of a "household change". The nature of the change, however, differs, as will be seen when the households' characteristics are compared. A large proportion of both inner-city (36 percent) and suburban (46 percent) owners decided to move so that they could become home owners. The housing options that the two groups considered were also different; the inner-city buyers showed a greater commitment to the condominium sector, and fewer considered single-family house options. A large proportion of the inner-city buyers said they would buy a condominium again should they move, and most plan to stay in their current dwelling unit for a longer period of time. The suburban buyers felt that they could not afford to buy their preferred single-family house option. They intend their next move to take them to a single-family dwelling.

The perceived extent of available housing options was similar for the two sub-markets, and the factors influencing the owners' choice of condominium project did not differ much. Most of the respondents noted that their "experience with condominium living" was much better than expected.

Table 3  
VARIABLE MEANS

	Inner City	Suburb	t-stat	(sig)
<b>A. Condominium Characteristics</b>				
1. Row or Townhouse	.33	.79	14.0	.00
2. High-Rise	.49	.11	12.4	.00
3. Number of Rooms	3.72	4.11	5.4	.00
4. Room Size (sq. ft.)	359	337	1.6	.10
5. Unit Area (sq. ft.)	1263	1353	1.0	.31
<b>B. Household Characteristics</b>				
6. Dependent Children Present	.14	.41	7.6	.00
7. Single-Person Household	.29	.14	4.5	.00
8. Retired Only Household	.26	.20	.8	.40
9. Age of Household Head*	3.48	3.06	2.6	.01
10. Number of People	2.03	2.61	7.5	.00
11. Number of Commuters	1.10	1.31	3.3	.00
<b>C. Income &amp; Housing Cost (\$1983)</b>				
12. Household Income	32,917	26,496	2.4	.00
13. Housing Expenditure	522	520	.0	.98
14. Expenditure/Income Ratio	.20	.27	4.2	.00
15. Downpayment/Price Ratio	.47	.34	4.6	.00
16. Purchase Price	92,782	83,410	1.8	.07
<b>D. Previous Housing Characteristics</b>				
17. Number of Rooms	4.34	4.02	2.5	.01
18. Relative Size (+ smaller)	1.93	2.16	3.3	.00
19. Rented	.48	.56	1.7	.08
20. Condominium	.18	.16	.3	.72
21. Single-Family Detached	.40	.42	.4	.62
22. High-Rise	.31	.10	3.2	.00
<b>E. Mobility &amp; Commute Patterns</b>				
23. Years at Previous Unit	7.52	6.58	.9	.37
24. Years in Present Unit	3.73	3.97	1.8	.08
25. Present Commute Time (min.)	17.26	20.43	3.7	.00
26. Commute Time Saved	2.33	4.02	2.7	.00
27. From Outside CMA	.14	.21	2.0	.05
28. From Same Neighbourhood	.19	.12	3.1	.00
<b>F. Reasons for Last Move</b>				
29. Upgrade Housing Quality	.40	.52	3.3	.00
30. Physical Security	.28	.18	3.3	.00
31. Household Change	.28	.30	1.2	.22
32. Wanted Ownership Status	.36	.46	2.2	.03
<b>G. Options Considered</b>				
33. Only Condominiums	.59	.39	4.8	.00
34. Rental Considered	.12	.15	.5	.61
35. Single Detached	.35	.51	2.5	.01
36. Inner-City Locations	1.00	—	ne	ne
37. Suburban Locations	—	1.00	ne	ne

**H. Perception of Choice**

38. Unit Size (1 few, 4 many)	1.88	1.88	.0	.78
39. Location	1.53	1.64	.0	.63
40. Amenities	1.49	1.45	.0	.95
41. Price	1.48	1.57	.9	.33

**I. Reasons for Choice**

42. Less Upkeep in Condos	.80	.77	1.3	.19
43. Condominium Facilities	.48	.43	1.0	.32
44. Could Not Afford S.F.D.	.26	.49	5.7	.00
45. Investment Value	.19	.22	.0	.98

**J. Satisfaction & Plans**

46. Buy Condominium Again	.69	.52	5.2	.00
47. Better Than Expected	2.55	2.58	.9	.38
48. Expected Length of Stay	3.31	3.17	2.1	.03
49. Move to New Location	.50	.54	.4	.68
50. Plan to Buy S.F.D.	.29	.49	5.5	.00

Number of Cases	386	398		
-----------------	-----	-----	--	--

\* Categorical variable. See Appendix for explanation.

**The Discriminant Function**

Discriminant analysis develops a multivariate model for classifying sub-populations. A variable identifying the two sub-markets was constructed by assigning the value of "1" to the people who confined their search to the suburbs and "-1" to the inner-city respondents. The estimated discriminant function develops a set of weights for the original variables that would help distinguish between the two classes of respondents. The weights are similar to regression coefficients and form a linear equation that can be used to predict the classification of any respondent for whom data are available. The prediction is made by adding the weighted sum of the values taken by each of the variables in the discriminant function and seeing if they come closer to "1" or "-1" in value.

A large number of the variables used in the analysis contributed virtually no information when entered simultaneously in the multivariate analysis. Knowledge of the household's retired or non-retired status, for example, does not help discriminate sub-markets. The respondent's housing expenditure, previous condominium experience, previous occupation of a single-family detached house, commuting time saved as a result of the move, perception of available housing options, future plans to change location, and satisfaction with their condominium purchase are some of the other factors that do *not* help distinguish sub-markets.

Table 4 ranks the most important factors discriminating the sub-markets. A positive correlation indicates that an increase in the value

taken by the variable increases the likelihood that the attribute is associated with suburban markets. A negative correlation shows the higher value of the variable to be associated with the inner-city sub-market. As expected, the key distinguishing characteristics are related to building type and size of household. Suburban condominiums are most often built as row or townhouses, while high-rise condominium projects tend to be located in the inner city. Large households with dependent children move to the suburbs. The sub-markets can be distinguished by the large proportion of suburban households saying that they bought their condominium because they could not afford a single-family detached house and plan to buy a house in the future. The inner-city condominium owners are characterized by their planning to buy another condominium should they decide to move, by having considered only condominium options when they were last looking for a new dwelling, and by making larger down payments on their present unit. A larger proportion of inner-city buyers are single-person households, a characteristic that helps distinguish this sub-market.

The inner-city buyers more often stayed in their old neighbourhoods, and many had previously lived in high-rise buildings. They tended to be older than suburban buyers and had, on average, higher incomes. The expectation of a longer stay in the current condominium helps identify further the inner-city buyers. The number of people commuting to work is higher within suburban condominium markets. The discriminant function shows that a larger proportion of suburban buyers had moved from smaller dwellings, saying that they decided to move to upgrade their housing quality.

Despite the larger number of people working outside the home, the suburban condominium market is distinguished by its households having to make a greater financial effort to pay for housing. Their housing expenditure-to-income ratio is higher than that of the inner-city buyers. The price of condominiums has a negative correlation with the principal component, indicating that inner-city condominiums are more expensive. The correlation, however, is surprisingly low (-.10). This finding is sensitive to sample strategy. Work with geographically disaggregated data showed that price was the most important discriminating variable across the Toronto-Mississauga sub-samples. The correlation of the discriminant function with the full set of fifty variables is presented in the Appendix as Table A4.<sup>5</sup> This table also

<sup>5</sup>I am indebted to an anonymous referee for raising a series of important questions regarding the possible effects of the sampling strategy used for the purpose of this paper. The robustness of the conclusions developed by using the whole sample were tested by comparing the results with those developed by using only the City of Toronto and Mississauga data.

presents the correlation of the discriminant function derived by using only Toronto and Mississauga data. This second function classified respondents according to their having made a choice between a suburban and an inner-city location. With the exception of the price variable, the Toronto-Mississauga results are similar to those developed with the larger sub-sample. This indicates that the conclusions are robust and would not differ in important ways had the sampling ratios been different.

**Table 4**  
**VARIABLES RANKED BY THEIR CORRELATION WITH THE DISCRIMINANT FUNCTION**  
(Suburbs = 1; Inner-city = -1)

#	Variable	Correlation
1	Row or Townhouse	.76
2	High-Rise	-.67
6	Dependent Children	.41
10	No. People in household	.41
44	Could Not Afford S.F.D.	.31
50	Plan to Buy S.F.D.	.30
3	No. Rooms in Condominium	.29
46	Would Buy Condominium Again	-.28
33	Considered Only Condominium	-.26
15	Percent Down Payment	-.25
7	Single-Person Household	-.24
14	Expenditure/Income Ratio	.22
25	Average Commute Time	.20
30	Moved to Gain Security	-.18
29	Moved to Upgrade Housing	.18
18	Previous Unit Smaller	.18
11	No. Commuters in Household	.18
22	Previous Dwelling High-Rise	-.17
28	Stayed in Neighbourhood	-.17
9	Age of Head of Household	-.14
35	Considered Buying S.F.D.	.14
17	No. Rooms in Previous Dwelling	-.14
12	Annual Household Income	-.13
32	Wanted Home Ownership	.12
48	Expected Length of Stay	-.12
27	Moved from Outside CMA.	.11
16	Price	-.10
Percent Accurately Classified		
	Suburbs	82.8
	Inner City	69.7
Number of Cases*		573

\* Cases with missing values for a continuous variable were dropped from the discriminant analysis.

Taken as a whole, the discriminant function distinguishes the inner-city population from the suburban by the households' life-cycle stages. The larger households with children, low down payments, and more than one person working outside the home are improving their housing conditions by moving to suburban condominiums. They plan to buy a single-family house when they can afford a good one. By contrast, the inner-city market is defined by the older households that were more committed to the condominium sector when they last looked for housing and that plan to stay within this sector. Further analysis of the characteristics of each sub-market will be carried out using principal component analysis.

### The Principal Components

The advantage of principal component analysis is that the search for market segments can be started without prejudging the effect of spatial attributes. Unlike discriminant analysis, principal component analysis allows the description of sub-markets that cross spatial boundaries. The potential for a subtler entry of the spatial variable into the analysis allows the development of a more realistic model of the interrelationships within a complex housing market.

The elimination of the households that considered both inner-city and suburban locations will help identify the key differences between the more clearly definable sub-markets. It helps the search for differences between spatially differentiated markets by removing the people who would have considered both. This should leave a more polarized population in the factor analysis, which will consequently allow more variance to be absorbed by the first principal components. In a sense, eliminating the group straddling the spatial boundaries helps remove background disturbances, thereby allowing the analysis greater power in distinguishing the people for whom spatial distinctions matter the most.

The sampling strategy affects the results of the principal component analysis slightly. Sensitivity analysis was carried out by drawing a sub-sample of the Toronto-Mississauga respondents and examining the principal components developed with these data. The results are compared with the full sub-sample in Table A5 in the Appendix. The general question about respondents' search patterns allowed them to define the meaning of the terms "inner city" and "suburb". The meaning of these terms depends on the city with which the respondent is familiar. Tests using only the Toronto-Mississauga data yielded results similar to the first two principal components presented in the following paragraphs. The third and fourth principal components obtained

with the Toronto-Mississauga sample were not highly correlated with the variable identifying the data (.21 and -.08). Our ability to gain more interesting and interpretable third and fourth components using the larger data set may have been influenced by the greater variety of geographic areas it includes under the inner-city and suburban classifications.

The first four principal components are described in Table 5. Together, they account for 34.1 percent of the variance contained in the entire set of fifty variables. As with the discriminant function, positive correlations are associated with suburban locations and negative correlations align with the inner-city respondents. Table 5 describes the principal components by ranking the original variables that have a correlation coefficient with an absolute value greater than .30.

The first component develops a view similar to that gained through discriminant analysis and the preliminary comparison of variable means. The main distinguishing characteristics tell of the wealthier, older buyers moving to the inner city. They tell of the younger buyers being able to buy into the suburban condominium market as a result of the lower housing prices and their willingness to accept higher commuting costs. Condominiums offer a new, valued option for older households. They provide the households who want to own their home with an opportunity to live in the inner city. The condominium option, by allowing young people an earlier entry to home ownership, can be seen to increase the ease and the rate at which these households can move within the city and match their housing purchases to their housing needs. Their buying higher-density housing, as opposed to single-family housing, is increasing suburban densities.

The second principal component also has a spatial dimension, as demonstrated by its strong correlation (.57) with the variable distinguishing the inner-city and suburban buyers. The new characteristics of condominium sub-markets provided by this component are quite different from those provided by the first component. The second component shows that the previous owners of large single-family houses are attracted to suburban row and townhouses. Large households with dependent children may be moving out of single-family houses to form another, smaller segment within the suburban condominium market. This principal component may also be revealing the characteristics of a distinct inner-city sub-market. The negative correlations tell of the smaller, single-person households that formerly lived in high-rise apartments buying inner-city condominiums. This group is improving its housing quality while valuing the home-ownership status offered by condominiums. The second principal component identifies the inner-city market segment formed by young, upwardly mobile, single-person households or couples without children.



Table 5  
DESCRIPTION OF THE PRINCIPAL COMPONENTS

Variable	Correlation
<b>First Principal Component</b>	
Plan to Buy S.F.D.	.62
Could Not Afford S.F.D.	.57
Row/Townhouse Condominium	.56
Dependent Children Present	.56
Previous Dwelling Smaller	.56
Previous Dwelling Rented	.56
Wanted Home Ownership	.54
Expenditure/Income Ratio	.51
Moved to Upgrade Housing Quality	.50
No. of People in Household	.49
No. of Commuters	.49
Considered S.F.D. Options	.40
Wanted Condominium Facilities	-.33
Wanted Physical Security	-.44
Considered Only Condominiums	-.45
Would Buy Condominium Again	-.45
Previous Housing S.F.D.	-.46
No. Rooms in Previous Dwelling	-.46
Retired Only Household	-.46
Years at Previous Unit	-.50
High-Rise Condominium	-.52
Downpayment/Income Ratio	-.58
Age of Head of Household	-.62
Search: (1 = Suburb; 0 = Inner-City)	.51
Eigen Value	7.35
Percent Variance	14.7
<b>Second Principal Component</b>	
Previous Housing S.F.D.	.57
No. Rooms in Previous Dwelling	.45
Row/Townhouse Condominium	.41
No. People in Household	.39
No. Rooms in Condominium	.34
Dependent Children Present	.30
Single-Person Household	-.34
Wanted Home Ownership	-.36
High-Rise Condominium	-.36
Upgrade Housing Quality	-.37
Previous Dwelling Smaller	-.37
Previous Dwelling Rented	-.49
Previous Dwelling High-Rise	-.54
Search: (1 = Suburb; 0 = Inner-City)	.57
Eigen Value	4.03
Percent Variance	8.1

**Third Principal Component**

Choice in Price	.77
Choice in Location	.76
Choice in Amenities	.75
Choice in Unit Size	.71
Household Income	.34
Purchase Price	.31
Search: (1 = Suburb; 0 = Inner-City)	.13
Eigen Value	3.21
Percent Variance	6.4

**Fourth Principal Component**

Single Person Household	.45
Housing Expenditure	-.31
Unit Area of Condominium	-.32
Dependent Children Present	-.35
No. Rooms Previous Dwelling	-.36
No. Commuters	-.37
No. Rooms in Condominium	-.37
Household Income	-.39
No. People in Household	-.49
Search: (1 = Suburb; 0 = Inner-City)	.42
Eigen Value	2.46
Percent Variance	4.9
Number of Cases	784

The third principal component has no spatial dimension. Interestingly, it is the only one in which condominium price is a distinguishing characteristic. This component identifies the condominium buyers that saw themselves as having many housing options from which to choose. These households also had the highest incomes and were buying the most expensive condominiums. The component's lack of a spatial dimension indicates that condominium prices are not important factors distinguishing inner-city and suburban sub-markets. The analysis shows that price is much less of a distinguishing factor than is the household's monthly housing expenditure and the size of the down payment.

The last principal component listed in Table 5 identifies yet another inner-city market segment. It shows that larger, high-income households with dependent children form a segment within the inner-city sub-market. These households often have more than one wage earner, they have high monthly housing expenditures, and they buy the larger condominium units. Their previous units tended to be smaller, and their condominium purchase is increasing their housing

consumption. Building type is not a distinguishing characteristic, as this group is distributed across high-rise buildings and row and town-houses. This principal component identifies the market segment formed by the high-income families who are buying inner-city condominiums.

### Conclusions

The condominium sector offers a higher-density housing option to households who want to remain home owners. It is attracting former single-family house owners, young people who do not yet have children and, to a lesser extent, higher-income families. The inner-city condominium sub-markets are diverse, as shown in the analysis. Inner-city condominiums attract higher-income households. One small sub-market is composed of families moving to the inner city. The inner-city condominium sector also attracts older households who leave larger houses behind for younger families. The suburbs are changed as condominiums offer home ownership in higher-density housing. Suburban condominiums tend to serve as stepping stones for young families who intend to eventually buy a single-family house.

The condominium sector, by offering a higher-density home-ownership option, makes it earlier for households to adjust their housing purchases to meet their changing housing needs. It increases housing options and the potential for consumers to gain greater surplus value from their housing purchases. It also increases the ease with which households can accompany their life-cycle stages with moves to new and more satisfying housing options.

### References

- Alonso, William. 1964. *Location and Land Use*. Cambridge: Harvard University Press.
- Blankstein, Murray, et al. 1970. *National Surveys of Condominium Owners*. Toronto: Condominium Research Associates.
- Dinkelspiel, A. 1981. *Condominiums — The Effects of Conversion on a Community*. Boston: Auburn House Publishing Company.
- Hamilton, Stanley W., and R. Roberts. 1973. *Condominium Development and Ownership*. Vancouver: Real Estate Board of Greater Vancouver.
- Hamilton, Stanley W., et al., 1978. *Condominium — A Decade of Experience in British Columbia*. Vancouver: B.C. Real Estate Association.
- Hurtubise, Jules. 1982. "Bilan de la copropriété divise et profil socio-économique des copropriétaires dans la région de Montréal," *Actualité immobilière*, 5, 4 (hiver).
- Muth, Richard. 1969. *Cities and Housing*. Chicago: University of Chicago Press.

- Ricardo, David. 1817. *The Principals of Political Economy and Taxation* (1969 reprint). Everyman's Library. London: Aldine Press.
- Skaburskis, Andrejs. 1988. "The nature of Canadian condominium sub-markets and their effect on the evolution of the urban spatial structure," *Urban Studies*, 25:109-123.
- Skaburskis, Andrejs, and Stanley Hamilton. 1984. *National Condominium Market Study: Working Paper 5 Survey Methods and Response Rates*. Ottawa: CMHC.
- U.S. Department of Housing and Urban Development. 1975. *Condominium Cooperative Study*. Volume 1.

## Appendix

### VARIABLE DEFINITIONS

- 
- A. Condominium Characteristics**
1. Row or Townhouse: yes 1; no 0
  2. High-Rise: yes 1; no 0
  3. Number of Rooms: number of bedrooms + dens + 2
  4. Room Size (sq. ft.) unit floor area ★ number rooms
  5. Unit Area (sq. ft.)
- B. Household Characteristics**
6. Dependent Children Present: yes 1; no 0
  7. Single-Person Household: yes 1; no 0
  8. Retired Only Household: yes 1; no 0
  9. Age of Household Head: ordinal variable with 0-29; 30-39; 40-49; 50-64; 65+ age categories
  10. Number of People Living in the Household
  11. Number of Commuters: number of people working outside the home
- C. Income and Housing Cost (\$1983)**
12. Household Income: annual income
  13. Housing Expenditure: monthly expenditure on mortgage, taxes, utilities, condominium fees
  14. Expenditure/Income Ratio
  15. Downpayment/Price Ratio
  16. Purchase Price: adjusted to 1983 dollars by using the national consumer price index
- D. Previous Housing Characteristics**
17. Change in Room Number: number of rooms in previous unit
  18. Smaller: if present unit smaller 1; if not 0
  19. Rented: if previous unit rented 1; if not 0
  20. Condominium: if previous unit a condominium 1; if not 0
  21. Single-Family Detached: if yes 1; if not 0
  22. High-Rise: if previous unit a highrise 1; if not 0
- E. Mobility & Commute Patterns**
23. Years at Previous Unit
  24. Years in Present Unit
  25. Present Commute Time (min.): average commute time of people working outside home
  26. Commute Time Saved: present less previous commute time
  27. From Outside CMA: yes 1; no 0
  28. From Same Neighbourhood: yes 1; no 0
- F. Reasons for Last Move**
29. Upgrade Housing Quality: yes 1; no 0
  30. Physical Security: yes 1; no 0
  31. Household Change: yes 1; no 0
  32. Wanted Ownership Status: yes 1; no 0

- G. Options Considered**
33. Only Condominiums: yes 1; no 0
  34. Rental Considered: yes 1; no 0
  35. Single Detached: yes 1; no 0
  36. Inner-City Locations: yes 1; no 0
  37. Suburban Locations: yes 1; no 0
- H. Perception of Choice**
38. Unit Size: practically none 1; few 2; wide selection 3
  39. Location: practically none 1; few 2; wide selection 3
  40. Amenities: practically none 1; few 2; wide selection 3
  41. Price: practically none 1; few 2; wide selection 3
- I. Reasons for Choice**
42. Less Upkeep in Condos: yes 1; no 0
  43. Condominium Facilities: yes 1; no 0
  44. Could Not Afford S.F.D.: yes 1; no 0
  45. Investment Value: yes 1; no 0
- J. Satisfaction & Plans**
46. Buy Condominium Again: yes 1; no 0
  47. Better Than Expected: 1 worse, 2 same, 3 better
  48. Expected Length of Stay: 1 less than one, 4 more than 5 years
  49. Move to New Location: yes 1; no 0
  50. Plan to Buy S.F.D.: yes 1; no 0
-

Table A1  
SAMPLE PROPORTION BY CITY AND PROJECT CATEGORIES

City	Project Category	Total Projects*	Total in Sample	Total Units	Total in Sample	Percent Units Sampled
Halifax	All	25	25	1,623	408	25.1%
Quebec	1. 40- units	16	9	345	96	27.8
	2. 40+ units	13	13	1,228	311	25.3
		29	22	1,573	407	25.8
Trois-Rivières	All	2	2	60	60	100.0
Toronto	1. 40- units	56	16	948	59	6.2
	2. 40+ units	34	15	5,724	318	5.6
		90	31	6,672	377	5.7
Mississauga	1. Row NHA	92	14	7,088	176	2.5
	2. Apt. NHA	37	5	2,184	48	2.2
	3. Row Other	36	5	3,172	49	1.5
	4. Apt. Other	24	3	4,828	96	2.0
	5. Other	16	3	1,412	59	4.2
		205	30	18,684	428	2.3
Saskatoon	All	10	10	659	255	38.7
Calgary	1. 40- units	455	16	3,915	108	2.7
	2. 40+ units	204	14	17,154	333	1.9
		659	30	21,069	441	2.1
Kelowna	All	72	20	1,716	323	18.8
Vancouver	1. 40- pre 1978	162	18	3,225	151	4.7
	2. 40+ pre 1978	66	9	4,077	185	4.5
	3. 40- 1978+	255	3	2,946	108	3.7
	4. 40+ 1978+	45	5	3,017	121	4.0
		528	35	13,265	565	4.3

\* Excludes duplex projects.

Source: Skaburskis and Hamilton 1984:3.

Table A2  
CONDOMINIUM PROJECTS SURVEYED

	Projects Sur-veyed*	Projects Respond-ing**	New Replace-ment	Projects Sur-veyed*	Chair-person Res-ponses	Response Rate
Halifax	25	23	0	23	18	78%
Quebec City	22	20	1	21	17	81
Trois-Rivières	2	2	0	2	2	100
Toronto	31	22	7	29	26	90
Mississauga	30	24	7	31	20	64
Saskatoon†	10	10	0	10	7	70
Calgary	30	21	6	27	15	56
Kelowna	20	16	2	18	16	88
Vancouver	35	31	4	35	22	63
Total	205	169	27	196	143	73%

\* Initial Sample. \*\* Final Sample. † All existing projects which were not primarily renter occupied.

Source: Skaburskis and Hamilton 1989:6, 7.

Table A3  
CONDOMINIUM OCCUPANTS SURVEYED

City	Projects Sampled	Units in Surveyed Projects	Question-naires Delivered	Occupant Responses	Response Rate*
Halifax	23	1,623	409	268	65.5%
Quebec City	21	1,273	396	263	66.4
Trois-Rivières		60	60	41	68.3
Toronto	29	2,662	403	184	45.7
Mississauga	31	2,981	417	183	43.9
Saskatoon	10	632	241	142	63.4
Calgary	27	1,457	397	205	51.6
Kelowna	18	510	311	158	50.8
Vancouver	35	2,218	531	291	54.8
Total	196	13,416	3,165	1,735	54.8%

\* Excludes 60 incomplete responses. Includes renters. Of the 1,735 respondents, 1,410 were owner-occupants.

Source: Skaburskis and Hamilton 1989:6, 7.

**Table A4**  
CORRELATION OF VARIABLES WITH THE CANONICAL  
DISCRIMINANT FUNCTIONS

	Search (Suburb = 1) (Inner-City = -1)	Toronto (Mississauga = 1) (Toronto = -1)
<b>A. Condonimium Characteristics</b>		
1. Row or Townhouse	.76	.41
2. High-Rise	-.67	-.46
3. Number of Rooms	.29	.39
4. Room Size (sq. ft.)	-.09	-.21
5. Unit Area (sq. ft.)	.05	-.11
<b>B. Household Characteristics</b>		
6. Dependant Children Present	.41	.41
7. Single-Person Household	-.24	-.26
8. Retired Only Household	-.05	-.07
9. Age of Household Head	-.14	-.17
10. Number of People	.41	.41
11. Number of Commuters	.18	.28
<b>C. Income &amp; Housing Cost (\$1985)</b>		
12. Household Income	-.13	-.15
13. Housing Expenditure	.00	-.14
14. Expenditure/Income Ratio	.22	.14
15. Downpayment/Price Ratio	-.25	-.26
16. Purchase Price	-.10	-.46
<b>D. Previous Housing Characteristics</b>		
17. Number of Rooms	-.14	-.02
18. Relative Size (+ smaller)	.18	.13
19. Rented	.09	.14
20. Condominium	.02	-.01
21. Single-Family Detached	.03	-.02
22. High-Rise	-.17	-.02
<b>E. Mobility &amp; Commute Patterns</b>		
23. Years at Previous Unit	-.05	-.18
24. Years in Present Unit	.09	-.06
25. Present Commute Time (min.)	.20	.27
26. Commute Time Saved	.02	.01
27. From Outside CMA	.11	.06
28. From Same Neighbourhood	-.17	-.04
<b>F. Reasons for Last Move</b>		
29. Upgrade Housing Quality	.18	.13
30. Physical Security	-.18	-.05
31. Household Change	.07	.04
32. Wanted Ownership Status	.12	.22

	Search (Suburb = 1) (Inner-City = -1)	Toronto (Mississauga = 1) (Toronto = -1)
<b>G. Options Considered</b>		
33. Only Condominiums	-.26	-.13
34. Rental Considered	.03	-.07
35. Single Detached	.14	.05
36. Inner-City Locations	ne	ne
37. Suburban Locations	ne	ne
<b>H. Perception of Choice</b>		
38. Unit Size (1 few, 4 many)	.01	-.09
39. Location	.03	.00
40. Amenities	-.05	-.07
41. Price	.06	-.08
<b>I. Reasons for Choice</b>		
42. Less Upkeep in Condos	-.07	-.04
43. Condominium Facilities	-.05	-.08
44. Could Not Afford S.F.D.	.31	.36
45. Investment Value	.00	.06
<b>J. Satisfaction &amp; Plans</b>		
46. Buy Condominium Again	-.28	-.25
47. Better Than Expected	.05	-.01
48. Expected Length of Stay	-.12	-.07
49. Move to New Location	.02	.08
50. Plan to Buy S.F.D.	.30	.26
Canonical Correlation	.6121	.7838
PERCENT ACCURATELY PREDICTED		
Suburban search	77.8%	
Inner-City search	81.7%	
Mississauga resident		85.6%
Toronto resident		86.1%
Number of Cases	573	202

Table A5

VARIABLE CORRELATIONS WITH THE PRINCIPAL COMPONENTS FOR THE  
9-CITY AND THE TORONTO/MISSISSAUGA SUBSAMPLES

	Search (9 Cities)**		Toronto/ Mississauga**	
	1	2	1	2
Search (1 = Suburb; 0 = City)	.51	.57		
Suburb (1 = Mississauga; 0 = Toronto)			.54	.38
<b>A. CONDOMINIUM CHARACTERISTICS</b>				
1. Row or Townhouse	.56	.41	.70	*
2. High-Rise	-.52	-.36	-.73	*
3. Number of Rooms	*	.34	.46	.37
4. Room Size (sq. ft.)	*	*	-.61	*
5. Unit Area (sq. ft.)	*	*	*	*
<b>B. HOUSEHOLD CHARACTERISTICS</b>				
6. Dependant Children Present	.56	.30	.61	.35
7. Single-Person Household	*	-.34	*	*
8. Retired Only Household	-.46	*	-.33	*
9. Age of Household Head*	-.62	*	-.63	*
10. Number of People	.49	.39	.53	.40
11. Number of Commuters	.49	*	.57	*
<b>C. Income &amp; Housing Cost (\$1983)</b>				
12. Household Income	*	*	*	*
13. Housing Expenditure	*	*	*	-.33
14. Expenditure/Income Ratio	-.51	*	.57	*
15. Downpayment/Price Ratio	-.57	*	-.64	*
16. Purchase Price	*	*	-.63	*
<b>D. Previous Housing Characteristics</b>				
17. Number of Rooms	-.46	.45	-.45	.46
18. Relative Size (+ smaller)	.56	-.37	.58	-.30
19. Rented	.56	-.49	.60	-.34
20. Condominium	*	*	*	*
21. Single-Family Detached	-.46	.57	-.49	.39
22. High-Rise	*	-.54	.31	-.49
<b>E. Mobility &amp; Commute Patterns</b>				
23. Years at Previous Unit	-.50	*	-.54	*
24. Years in Present Unit	*	*	*	*
25. Present Commute Time (min.)	*	*	*	*
26. Commute Time Saved	*	*	*	*
27. From Outside CMA	*	*	*	*
28. From Same Neighbourhood	*	*	*	*

	Search (9 Cities)**		Toronto/ Mississauga**	
	1	2	1	2
<b>F. Reasons for Last Move</b>				
29. Upgrade Housing Quality	.50	-.37	.49	-.35
30. Physical Security	-.44	*	-.47	*
31. Household Change	*	*	*	*
32. Wanted Home Ownership	.54	-.36	.58	-.33
<b>G. Options Considered</b>				
33. Only Condominiums	-.45	*	-.43	*
34. Rental Considered	*	*	*	*
35. Single Detached	.40	*	.30	*
36. Inner-City Locations	-.51	-.57	-.32	-.48
37. Suburban Locations	.51	.55	.36	*
<b>H. Perception of Choice</b>				
38. Unit Size (1 few, 4 many)	*	*	*	-.61
39. Location	*	*	*	-.60
40. Amenities	*	*	*	-.59
41. Price	*	*	*	-.66
<b>I. Reasons for Choice</b>				
42. Less Upkeep in Condos	*	*	-.32	*
43. Condominium Facilities	-.33	*	-.41	*
44. Could Not Afford S.F.D.	.57	*	.74	*
45. Investment Value	*	*	*	*
<b>J. Satisfaction &amp; Plans</b>				
46. Buy Condominium Again	-.45	*	-.51	*
47. Better Than Expected	*	*	*	*
48. Expected Length of Stay	*	*	-.38	*
49. Move to New Location	*	*	*	*
50. Plan to Buy S.F.D.	.62	*	.63	*
Eigen Value	7.35	4.03	9.34	4.12
Percent Variance	14.7%	8.1%	18.7%	8.2%
Number of cases	785		304	

\*Correlation below .30.

\*\*The signs of the second principal component have been changed in both cases to ease the comparison of the correlation coefficients.